

مراجعة

كيمياء عامة CH3

لطلاب السنة التحضيرية بجامعة الملك خالد
بأبها – المحالة

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لا تنسى زيارة المدونة <http://kku-a.blogspot.com>

و نشر المدونة بين الطلاب لتعم الفائدة

Revision

$\nu \propto \frac{1}{\lambda}$ inversely
 $E \propto \nu$ directly
 $E \propto \frac{1}{\lambda}$ inversely

- Choose The Correct Answer:

- 1-The energy of light is proportional to its wavelength:
 A) directly B) Inversely C) Randomly D) not related
- 2- Light behaves as:
 A) particle B) wave C) both a and b D) neither a nor b
- 3- The distance between identical points on successive waves is called.....
 A) Frequency B) Photon C) Wavelength D) Wave number
- 4-The electromagnetic radiation with longest wave length is:
 A) X-rays B) Infra-red C) UV D) Radio wave
- 5- Which of the following type of radiation has the highest energy?
 A) Microwave B) Infrared C) visible D) X-ray
- 6- Which of the following type of radiations has the lowest wavelength (λ)?
 a) Microwave b) Visible c) Ultraviolet d) Infrared
- 7-The wavelength (λ) of sodium lamp's light is 589 nm. What is the frequency of this radiation [$C = 3 \times 10^8$ m/sec].

$$\nu = \frac{c}{\lambda} = \frac{3 \times 10^8 \text{ m} \cdot \text{s}^{-1}}{589 \times 10^{-9} \text{ m}} = 5.09 \times 10^{14} \text{ sec}^{-1}$$
 A) $5.09 \times 10^5 \text{ sec}^{-1}$ B) $5.09 \times 10^{14} \text{ sec}^{-1}$ C) $5.09 \times 10^{12} \text{ sec}^{-1}$ D) $1.0 \times 10^5 \text{ sec}^{-1}$
- 8-What is the frequency of green light having a wavelength of 521 nanometers?
 $[C = 3 \times 10^8 \text{ m/sec}]$

$$\nu = \frac{c}{\lambda} = \frac{3.0 \times 10^8}{521 \times 10^{-9}} = 5.76 \times 10^{14} \text{ sec}^{-1}$$
 a) $5.21 \times 10^7 \text{ sec}^{-1}$ b) $5.76 \times 10^7 \text{ sec}^{-1}$ c) $5.76 \times 10^{11} \text{ sec}^{-1}$ d) $5.76 \times 10^{14} \text{ sec}^{-1}$
- 9- The Wave length (λ) in meters of the line spectrum of (Hg) whose frequency (ν) is $6.88 \times 10^{17} \text{ sec}^{-1}$ equals ($C = 3.00 \times 10^8 \text{ m/s}$).

$$\lambda = \frac{c}{\nu} = \frac{3.00 \times 10^8 \text{ m} \cdot \text{s}^{-1}}{6.88 \times 10^{17} \text{ s}^{-1}} = 4.36 \times 10^{-10} \text{ m}$$
 A) 4.63×10^{-3} B) 4.36×10^5 C) 4.63×10^4 D) 4.36×10^{-5}
- 10) What is the frequency (s^{-1}) of electromagnetic radiation that has a wavelength of 0.53 m?
 $[R_{\text{H}} = 2.18 \times 10^{-18} \text{ joule}, C = 3 \times 10^8 \text{ m/sec}]$

$$\nu = \frac{c}{\lambda} = \frac{3.00 \times 10^8 \text{ m} \cdot \text{s}^{-1}}{0.53 \text{ m}} = 5.66 \times 10^{14} \text{ s}^{-1}$$
 A) 5.7×10^8 B) 1.8×10^{-9} C) 1.6×10^8 D) 1.3×10^{-33}

- 11- The energy required to excite electron from $n=1$ to $n=3$ is..... [$R_{\text{H}} = 2.18 \times 10^{-18}$]

$$E = R_{\text{H}} \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right] = 2.18 \times 10^{-18} \times \left[1 - \frac{1}{9} \right] = 1.94 \times 10^{-18} \text{ J}$$
 a) $2.73 \times 10^{10} \text{ J}$ b) $4.70 \times 10^{-12} \text{ J}$ c) $1.94 \times 10^{-18} \text{ J}$ d) $1.70 \times 10^{-15} \text{ J}$

12- What is the maximum number of electrons in a 3d sublevel? subshell → 2 6 10
s p d

- A) 6 **B) 10** C) 14 D) 30

13- The number determines the shape of the orbital.

- A) n **B) l** C) m_l D) m_s

14- The quantum number determines energy of electrons:

- A) n** $E_n = -R_H \left(\frac{1}{n^2} \right)$ B) l C) m_l D) m_s

15- The quantum number determines the orientation of electron spin in magnetic field.

- A) n B) l C) m_l **D) m_s**

16- The sublevel orbital which can be occupied with a maximum 14 electrons is:

- A) 4f** B) 3d C) 6s D) 5p

17- Which sublevel is characterized by the set of quantum numbers?

n=3 l=2 $m_l = 1$ $m_s = +1/2$ s p d f
l = 0 1 2 3

- A) 3p **B) 3d** C) 1s D) 4f

18- The symbol of the element of lowest atomic number whose ground state has Four 3P electrons is..

- A) ${}_{17}\text{Cl}$ B) ${}_{19}\text{K}$ C) ${}_{13}\text{Al}$ **D) ${}_{16}\text{S}$**

19- How many unpaired electrons are there in an atom of Nitrogen (${}_{7}\text{N}$)?

- A) 1 B) 2 **C) 3** D) 4

20- Which set of quantum numbers can be used to characterize the sublevel (3p):

- A) $n = 4, l = 0, m_l = 0, m_s = +1/2$ B) $n = 3, l = 2, m_l = 1, m_s = -1/2$

- C) $n = 3, l = 1, m_l = 1, m_s = -1/2$** D) $n = 3, l = 0, m_l = 0, m_s = +1/2$

21- The number of orbitals in d-sub shell:

- A) 3 B) 4 **C) 5** D) 7

22- The electron orbital described by $n = 3, l = 2, m_l = 0, m_s = +1/2$

- A) 4p **B) 3d** C) 4s D) 4f

23- How many unpaired electrons are there is Sulphur (atomic number = 16)?

- A) 1 **B) 2** C) 4 D) 5

24- The sublevel with highest energy is:

- A) 3d **B) 4f** C) 6s D) 4p

25- The symbol of the element of lowest atomic number whose ground state has completed

d sub-level is:

A) Cr $4s^1, 3d^5$ B) Ni

$4s^1, 3d^{10}$

C) Cu

D) Ca

26- What is the valence shell electrons configuration of phosphorous (15P)?

A) $3s^2, 3p^3$ B) $3p^3$

C) $1s^2, 2s^2, 2p^3$

D) $2s^2, 2p^3$

27- Pauli Exclusion Principle states that

A) Electrons occupy degenerate orbitals singly to the maximum extent.

B) Electron of H atom moves in a circular path called orbit. Bohr's Model

C) Electrons travels in waves like light. De Broglie

D) No two electrons in an atom can have the same set of four quantum numbers.

28- The ion that is isoelectronic with $^{18}\text{Ar}^{18}$ is

A) $^{12}\text{Mg}^{+2}$ ^{10}Ne

B) $^{11}\text{Na}^{+}$ ^{10}Ne

C) $^{35}\text{Cl}^{-}$

D) $^{35}\text{Br}^{-}$

29- Which electronic configuration is impossible?

A) $1s^2, 2s^2, 2p^6, 3s^2$

B) $1s^2, 2s^2, 2p^6, 2d^2$

C) $1s^2, 2s^2, 2p^6, 3s^2, 3p^4$

D) $1s^2, 2s^2, 2p^6, 3s^1$

30- What is the electronic configuration for (Ni^{2+}) [the atomic number of Ni = 28]

A) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^6$

B) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^6$

C) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^{10}$

D) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^8$

31- The electronic configuration of (Fe^{3+}) Atomic number of Fe = 26

A) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^3$

B) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1, 3d^4$

C) $1s^2, 2s^2, 2p^6, 3s^2, 3p^5, 3d^4$

D) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^5$

32- The electronic configuration of Cr (24) is

$4s^1, 3d^5$

A) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^4$

B) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^0, 3d^6$

C) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1, 3d^5$

D) A + C

33- the electronic configuration of Cu (29) is

$4s^1, 3d^{10}$

A) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1, 3d^9$

B) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1, 3d^{10}$

C) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4p^6, 3d^5$

D) $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4p^1$

34- Which of the following atoms has the largest diameter?

A) F

B) Br

C) Cl

D) I

35- The ion that is isoelectronic with $(^{36}\text{Kr})\text{s}$

- A) Ca^{+2} B) Na^+ C) $^{17}\text{Cl}^-$ D) $^{35}\text{Br}^-$

36- Isoelectronic series are elements having

- A) the same number of neutrons. B) the same number of electrons.
 C) the same atomic number D) the same mass number.

37- Which pair is given in the correct order of increasing size ?

- A) $\text{Na}^+ > \text{Na}$ B) $\text{Cr}^{+2} > \text{Cr}^{+3}$ C) $\text{Cl} > \text{Cl}^-$ D) $\text{Mg} > \text{Ca}$

38- Which of the following elements has the highest atomic radius?

- A) ^9F B) ^5B C) ^4Be D) ^6C

39) The set of quantum numbers, $n = 2, l = 1, m_l = 0$

- A) is not allowed. B) describes one of five orbitals of a similar type.
 C) describes an electron in a 2p orbital. D) describes an electron in a 2d orbital.

40) The m_l quantum number for an electron in the 4p orbital

- A) may be 4 B) may be $+1/2$ or $-1/2$
 C) can have any value from +2 to -2 D) none of the above.

41) Four electrons in an atom have the quantum number given below. Which electron is at the lowest energy?

- A) $n = 2, l = 0, m_l = 0, m_s = +1/2$ B) $n = 2, l = 1, m_l = -1, m_s = -1/2$
 C) $n = 3, l = 0, m_l = 0, m_s = -1/2$ D) $n = 3, l = 1, m_l = 0, m_s = +1/2$

42) For an electron that has quantum numbers $n=3$ and $m_l = 2$, which of the following is true?

- A) it must have the quantum number $l = 2$
 B) it must have the quantum number $l = 1$
 C) it must have the quantum number $m_s = +1/2$
 D) it may have the quantum numbers, $l = 0, 1, 2$

43) For an electron that has quantum numbers $n=4$ and $m_l = 1$, which of the following is true?

- A) it must have the quantum number $m_s = +1/2$
 B) it must have the quantum number $n = 0$
 C) it must have the quantum number $l = 1$
 D) it may have the quantum numbers, $l = 0, 1, 2, 3$

44) Which of the following sets of quantum numbers is not allowed? impossible
 A) $n=3, l=0, m_l=1, m_s=+1/2$
 B) $n=2, l=1, m_l=-1, m_s=-1/2$
 C) $n=2, l=1, m_l=0, m_s=+1/2$
 D) $n=3, l=1, m_l=-1, m_s=+1/2$

45) Identify the sub-shell in which electrons with the quantum numbers $n=3, l=1$ may be found.
 A) 4f
 B) 3d
 C) 4d
 D) 3p

46) What is the total number of sub-shells associated with the $n=4$?

A) 5
 B) 10
 C) 6
 D) 4
 47) A radio station broadcasts on a frequency of $90 \times 10^6 \text{ s}^{-1}$. What is the wavelength of these radio waves in nanometers?
 $\lambda = \frac{c}{\nu}$

A) 33×10^8
 B) 33×10^{10}
 C) $0.33 \times 10^8 \text{ m}$
 D) 0.33×10^9
 48) The frequency of the blue line in the spectrum of mercury is $6.88 \times 10^{14} \text{ s}^{-1}$. What is the wavelength in centimeters?
 $\lambda = \frac{c}{\nu}$

A) 4.36×10^{-7}
 B) 2.29×10^{-6}
 C) 2.29×10^{-3}
 D) 4.36×10^{-5}
 49) What is the energy content for light of frequency $4.2 \times 10^{14} \text{ s}^{-1}$?
 $\Delta E = h \cdot \nu$
 A) 3.4×10^{-19}
 B) 2.5×10^{-18}
 C) 2.5×10^{-19}
 D) 2.78×10^{-19}

50) Which of the following statements is correct for an electron that has the quantum numbers $n=5$ and $m_l=-4$?
 A) the electron may be in a f orbital
 B) the electron must have a spin quantum number $m_s = -1/2$
 C) the electron may be in a p orbital
 D) none of the above

عدد مستويات الفرعية (sub-shell) n
 عدد المدارات (orbitals) n^2
 عدد الإلكترونات $2n^2$

n	l	ml	ms
1	0	0	$\pm 1/2$
2	0, 1	0, -1, +1	$\pm 1/2$
3	0, 1, 2	0, -1, +1, -2, +2	$\pm 1/2$
4	0, 1, 2, 3	0, -1, +1, -2, +2, -3, +3	$\pm 1/2$